

Shifting the paradigm for women in IT sector

Research report



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shift4T

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Introduction to the SHIFT4IT

The IT sector is one of the fastest-growing industries in the world, with computer and information technology occupations continually in great demand in the job market. In the EU context, job demands in the IT sector have been steadily on the rise, with the occupation of information and communication technicians having risen by 6.9% between Q1 2021 and Q12. However, at the same time, the IT sector has been struggling to fill a talent gap in many of its areas, including in IT project management. Organizations and companies are looking to optimise the customer experience and automate tasks, looking for a combination of technical and soft skills, such as tech know-how, empathy, expertise in sustainability and innovativeness, with leaders who can offer great solutions at a lower cost and deliver it quickly. The need for IT professionals in the job market signifies an opportunity for the young people preparing for entering the job market, but is also indicative of a problem, with some projections showing that in the next 5 years, if left unchecked, IT talent shortage will be one of the biggest threats that Europe's tech industry will be forced to face.

Although many recent reports show that diversity is critical to IT performance, with diverse teams performing better, having more engaged members and better job retention (McKinsey report, 2020), women remain widely underrepresented in IT roles. In the EU, women make up only 19.1% of the ICT sector, and that number is in decline. These statistics can be attributed to a wide array of interrelated factors such as opportunity, compensation and workplace safety and the society discouraging women from entering STEM and IT fields at almost every level of education. Simultaneously with fewer and fewer women pursuing IT careers, a tech talent gap is expanding, with a projection that 1.4 million to 3.9 million IT talents will be needed by 2027 in EU-27 countries. A viable solution for the growing problem is shifting the paradigm: motivating more women to do IT jobs and encouraging young people, the future workforce, to enter the market even if they do not have concrete technological backgrounds and degrees, by offering them formal and non-formal possibilities to gain specific skills needed to successfully perform IT jobs. In today's vast, ever-expanding IT job market there is room and need for more than just strictly IT positions, and providing a necessary level of both technical and soft skills needed to be successful IT project managers is one of the ways the talent gap can be overcome, especially with the strong cooperation and guidance of the business sector itself, in terms of giving outputs and results directly connected to realistic needs of the IT employers.

The general objective of the project is to develop a learning path for bridging the talent gap in the IT sector. Women are vastly underrepresented in the IT sector, while, paradoxically, they often have natural and instinctual skills needed for successful leading of teams and projects which is an important aspect of project-based operations in today's IT companies. This project will provide useful, purposeful, and

relevant training for young women and help them successfully operate in project management jobs in the IT sector. Specific objectives of the project are:

- (1) To develop training for project managers in the IT sector that will give young women skills to understand developers' language, be able to coordinate teams of developers and act as a bridge between developers and clients or end users.
- (2) To develop skills and knowledge of 80 young women with degrees in humanities and social sciences and prepare them for jobs in the IT sector.

Introduction to the research

What differentiates IT project managers from other IT specialists is their ability to understand the wider picture of developing IT products, focusing on the user and client experience more than on the technology and IT solutions behind the developed products. Starting from the idea that IT project managers must understand both the technology, language and logic being used by developers and programmers and elements of business, marketing and human resource management, project activities will help participants gather the required skills regardless of their lack of technical backgrounds. These will include logic behind programming and technical language, UX/UI design, agile project management methodology, which is an adaptive, collaborative approach widely used in the IT sector, as well as universal managerial skills including team management, project implementation, time management, communicating with clients, risk assessment and handling, delegating tasks, conflict management, online cooperation tools and methods, work in multicultural environment etc. This learning process will be monitored and mentored by representatives of the business sector, offering input and first-hand experiences, advice, and direction.

To define the real needs of the IT sector two-step research process was designed. Firstly, we aimed to ask 50 IT companies from Belgium, Croatia, Italy, and Romania to define the competencies required from PMs in the IT sector and to better understand the tasks that PMs are expected to lead in IT companies ([Questionnaire](#)). This gives us data for the creation of highly relevant curriculum and training. In addition, data is used for the creation of a selection procedure for young women that has degrees in humanities and social sciences.

The second step was to investigate relevant insights using detailed interviews with selected representatives of IT companies. The aim was to better understand the skills, competencies, traits, and experience of PMs in the IT sector, the selection of PMs in IT companies, and to comment in more detail curriculum proposed by the project consortium.

Aim

The research aimed to involve the representatives of IT companies in the definition of the curriculum for educating young women with degrees in humanities and social sciences to become Project Managers in the IT sector.

In a more detail, the aims were:

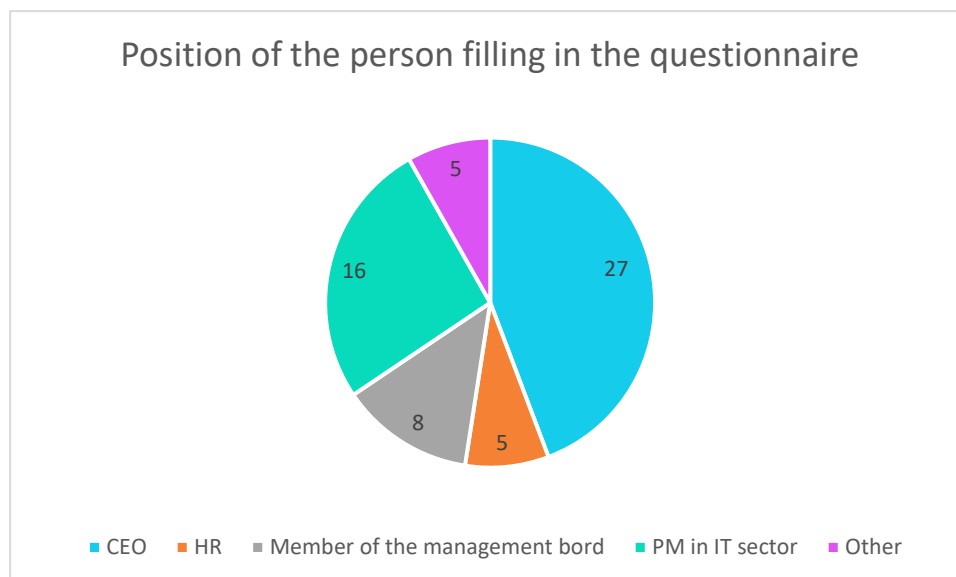
1. to understand better skills, competencies, traits, and experience expected from PMs in IT companies,
2. to understand the relevance of specific IT knowledge for PMs,
3. to better understand the job of PMs in different IT companies,
4. to better understand the selection procedures in IT companies,
5. to collect inputs regarding topics that the curriculum must have to be considered relevant by IT companies.

Target Group

The target group of the research were companies employing project managers in the IT sector and IT experts regardless of their size and sector. We aimed to reach CEOs, members of the board, HR experts, project managers or other experts in reached companies to collect relevant data.

Overall, 62 experts from 56 IT companies completed the questionnaire, most of them being CEO or PM in the IT sector (70%).

Figure 1 Position of people who participated in the questionnaire



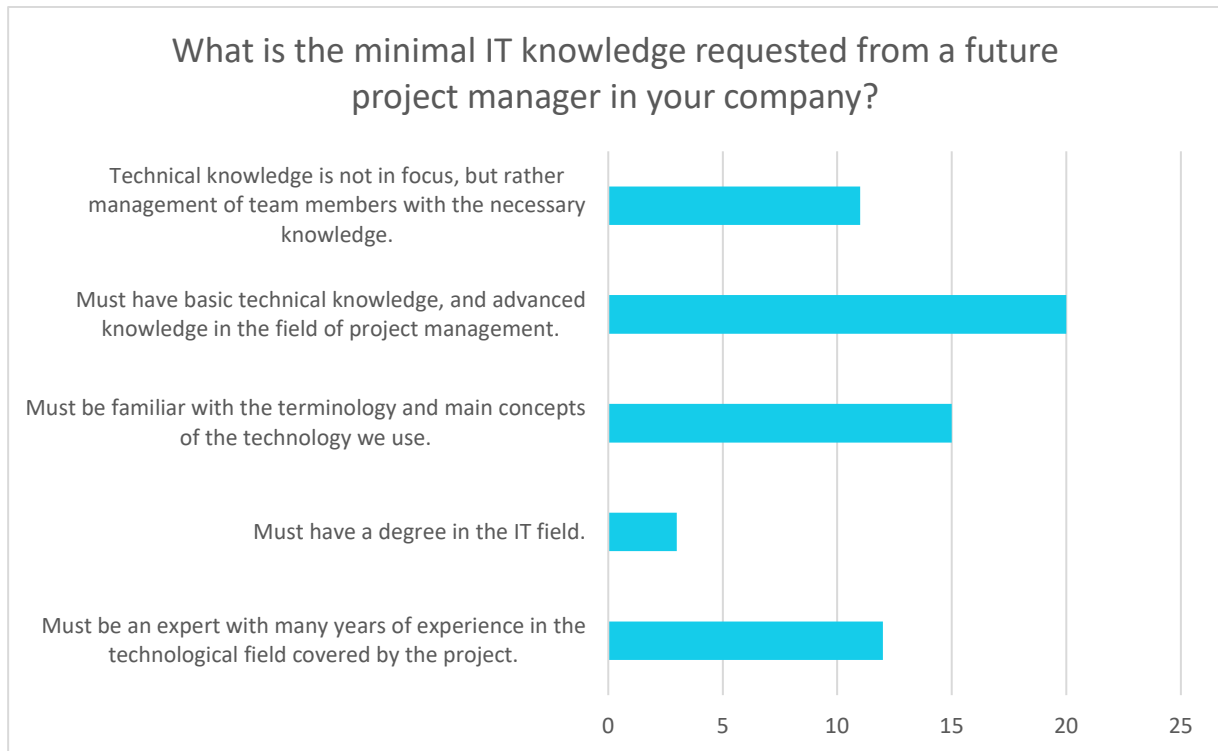
Answers from 5 people who participated in the questionnaire, not being CEOs, members of the board, HR experts or project managers were examined in more detail and their positions were considered as relevant – financial and communicational management, 2 freelancers with working experience in many different IT companies and junior consultant in IT sector. Therefore, their responses were included in the analysis.

56 IT companies involved in the research employ from 4 to 250.000 IT experts, most of them (46 or 82%) having less than 50 IT experts, 7 companies having 80 to 200 IT experts, 5 companies employing between 201 and 1000 IT experts and one company employing 2.000 IT experts and 250.000 IT experts.

Results

To better understand how we can satisfy the level of IT knowledge requested from PMs in IT companies, we asked participants to state what is minimal IT knowledge requested in their company and the reasons they apply their standards.

Figure 2 Minimal requested IT knowledge for PM in the IT sector.



Respondents who stated that „*Technical knowledge is not in focus, but rather the management of team members with the necessary knowledge.*“ or “*Must have basic technical knowledge, and advanced knowledge in the field of project management.*” stressed that managerial and communicational skills are in focus since technical knowledge is very specific and can be obtained only by working in their specific IT niche. Therefore, they consider that IT project managers must have basic IT knowledge, as a prerequisite for an easier understanding of the specific technology they will be working with, and advanced PM skills.

When respondents selected that PM „*Must be familiar with the terminology and main concepts of the technology we use*“ or “*Must be an expert with many years of experience in the technological field covered by the project.*” they stressed the importance of knowing the technology to be able to communicate between the team and the clients or in other words translating complex technical terms into simpler language that stakeholders can understand or they stress the company’s internal culture which foster computer science background among all employees. As IT companies are using many different technologies, specific knowledge can be obtained only by working. Therefore, they opt for mid- or senior-level IT experts as those who are usually promoted or selected as project managers in their companies.

The main tasks of project managers

When asked about the main tasks of project managers in their companies, CSOs and managers responded with many different tasks, all of them requiring technological knowledge, but with clear reference to managing of project, client, and the team rather than working on resolving specific IT issues within the project.

Responses organised in groups

Scope Management:

IT project managers define and manage the scope of the project meticulously to avoid scope creep, which is common in tech projects due to rapidly changing requirements and technological advancements. This involves creating detailed project specifications and ensuring all changes are aligned with business goals.

Resource and Capacity Planning:

This includes allocating the right mix of talent, such as developers, testers, and UI/UX designers, and ensuring there are enough resources to meet project demands. It also involves managing the hardware and software resources necessary for project execution.

Team and time management:

This includes a definition of tasks and task leaders, coordination of team and subcontractors, if necessary, organisation and leading of meetings and reviews, and conflict resolutions within the team. Definition of all project phases, definition of deadlines and their overseeing to be met, forecast deviations on time depending on the situation encountered during execution.

Task management:

Task management includes creating and maintaining comprehensive project documentation, finding solutions to problems and difficulties, managing changes in project scope, schedule, and costs, and quality prioritizing.

Coordination between client and IT team (company):

Interpreting and filtering customer requests, communication toward the team, negotiation of any non-technical/non-business blockers the team might hit along the way, and organisation of meetings and reviews.

Quality Assurance and Testing:

Project managers define the process of measuring project performance using appropriate systems, tools, and techniques. Ensuring the required quality level (quality control) and achieving client satisfaction. Ensuring the software meets quality standards and is free of bugs is crucial. IT project managers oversee the QA processes, including defining testing protocols, managing testing cycles, and ensuring that issues are resolved before the product goes live.

Managing the budget:

During the project, PMs have to manage, monitor and track all project resources. IT projects often involve significant investment in technology and personnel. Project managers are responsible for creating and monitoring the budget, ensuring the project remains financially viable without compromising on quality.

Technical Oversight:

IT project managers often have a background in technology, which allows them to provide technical direction and support to the development teams. They need to understand the technical aspects well enough to make informed decisions and manage technical risks.

Compliance and Security:

Especially in IT, adhering to regulatory and security standards is essential. Project managers ensure that projects comply with relevant laws and regulations, such as GDPR or HIPAA, and that data security protocols are followed.

Risk Management:

Identifying IT-specific risks, such as security vulnerabilities, data integrity issues, and technological dependencies, and creating mitigation strategies is a critical function. This also involves continuously monitoring and adjusting plans as the project progresses.

Post-Deployment Support and Maintenance:

After launching an IT project, project managers often oversee the initial support phase to handle any immediate post-launch issues. They also plan for ongoing maintenance and updates to ensure the software continues to perform well and remains secure.

Sales (specific companies) – two answers:

Project managers identify opportunities and deploy offers for customers.

When asked what **skills project managers need to have in the IT sector**, we obtained a list of skills, traits and knowledge respondents consider relevant in their companies.

Leadership and Team Management: Strong leadership skills to motivate and guide diverse teams, resolve conflicts, and foster a collaborative environment. Ability to understand different characters and use their skills and knowledge in the best possible way.

Communication: Excellent verbal and written communication skills to convey project goals, technical needs, and status updates to both technical and non-technical stakeholders. Verbal communication in English and impressive presentational skills.

Problem-Solving: Ability to quickly identify problems and think analytically to develop effective solutions, especially when under pressure.

Time Management: Skill in managing time effectively, prioritizing tasks, and meeting deadlines, while juggling multiple project elements.

Adaptability: Flexibility to adapt to changing project scopes, emerging project needs, and various challenges without losing momentum.

Negotiation and Persuasion: Skills in negotiating with stakeholders and vendors and persuading different parties to align with project goals.

Budgeting and Financial Management: Proficiency in managing budgets, forecasting costs, and controlling spending to ensure the project remains within financial boundaries.

Critical Thinking: The ability to assess situations rigorously, understand the implications of decisions and actions, and anticipate potential future issues.

Knowledge in marketing, PM and IT: Strong knowledge of some of PM techniques (Agile, Scrum and Six Sigma), ability to use PM tools (SAFE, ITIL, PMI, Prince 2, Jira, Confluence, Redmine, Boons, Youtrack) and version control systems (Gitlab, Github). In addition, knowledge of B2B marketing channels and techniques is important for some companies. Advanced knowledge and understanding of business software, production and editing of content, and its features.

Some of the relevant traits:

- Patience
- Empathy, but also assertiveness and proactivity
- Reliability
- Punctuality
- Multitasking
- Attention to details
- Organization
- Adaptability
- Conflict management
- Responsible
- Adaptability and continuous learning

When asked what added value PM brings to their companies, respondents answered:

Big-Picture Thinking: Unlike team members who may focus on specific tasks or phases of a project, project managers are trained to see the bigger picture and understand how various elements of the project interconnect and affect the overall business.

Diplomacy: Project managers often must balance differing viewpoints and interests of various stakeholders. They possess the diplomacy to navigate these potentially conflicting demands and find a middle ground that satisfies all parties.

Adaptability and Resilience: They are often more adaptable, and capable of responding to changes and challenges without losing momentum. Their resilience helps them to handle pressure and setbacks effectively, ensuring the project stays on track. They excel in identifying potential risks before they become issues, ensuring that projects are not only completed successfully but also sustainably.

Strategic Thinking: Project managers are strategic thinkers, able to devise plans that not only address immediate project needs but also align with long-term organizational goals. They understand the broader organizational context, and align project goals with business objectives, considering financial implications, market dynamics, and strategic impact. This holistic view enhances decision-making. With analytical thinking, they are very good at navigating complex problems and coming up with effective solutions.

Negotiation Skills: They typically have stronger negotiation skills, crucial when dealing with vendors, contractors, or during project scope adjustments. They know how to listen, mediate, and negotiate. This skill ensures that the organization gets the best value while maintaining project quality.

Leadership and Motivation: Project managers are leaders who inspire and motivate their teams, fostering a productive work environment and driving team members towards project completion and success. The PM makes it possible to frame the project, to have the necessary validations to move forward. They structure the work of the different teams and plan the different tasks to be carried out sequentially, indicating interdependencies. They bring emotional Intelligence and Empathy. Empathy enables Project Managers to understand team members' perspectives, anticipate needs, and address concerns. Emotional intelligence helps navigate complex interpersonal dynamics, fostering collaboration and trust. They can make tough decisions quickly, often under pressure, while considering the best interests of the project and the company.

To evaluate the proposed selection process of future PMs in IT sector, we listed the main competences that will be part of the selection process and asked participants to evaluate their importance for PMs in their companies.

Results show that all stated competencies must be above average (4,97 - 6,35 out of 7), except for a diploma in the IT sector (3,5 out of 7).

Figure 3 Relevance of different competencies for PMs in IT sector expressed in raw data

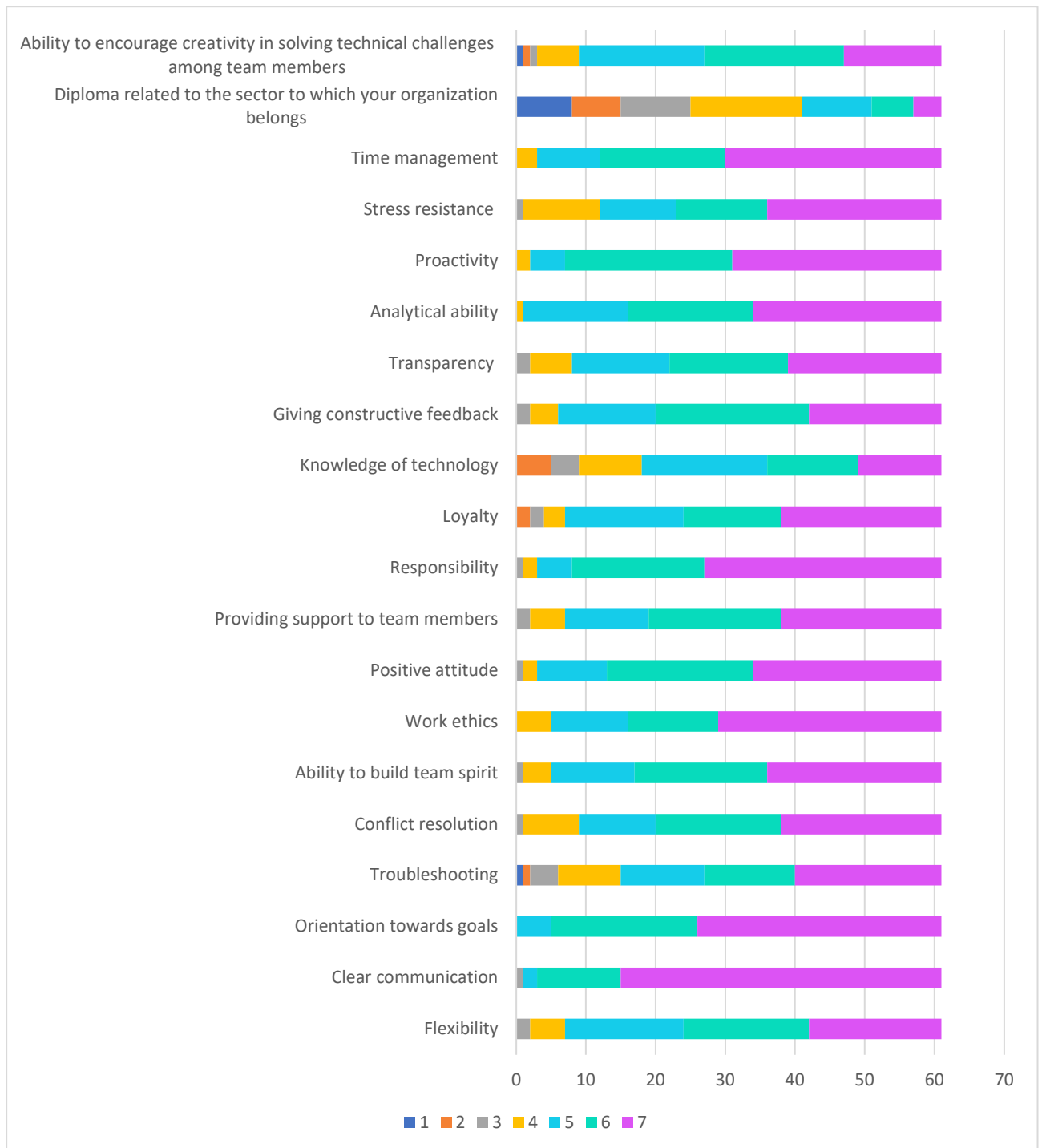
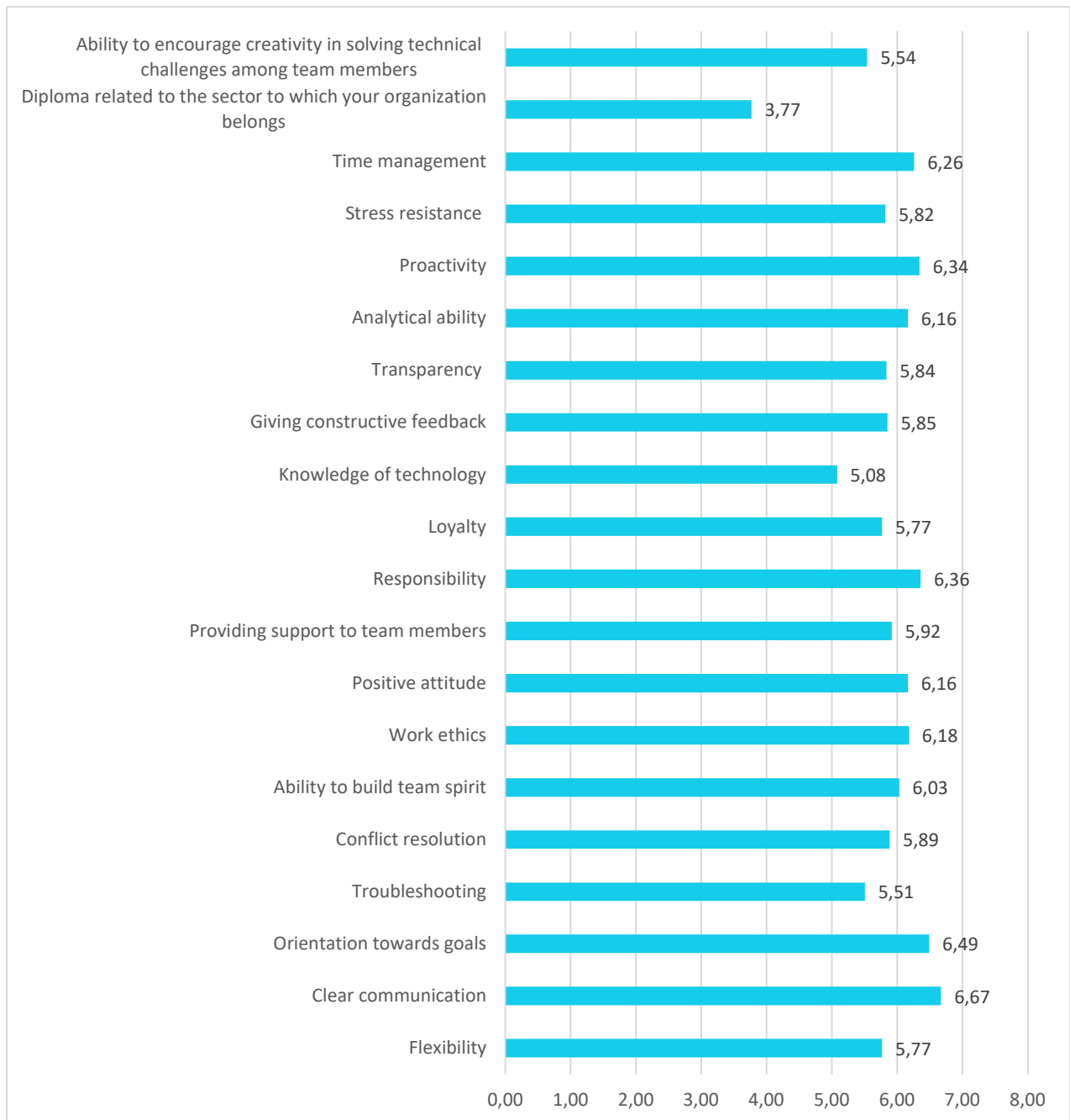
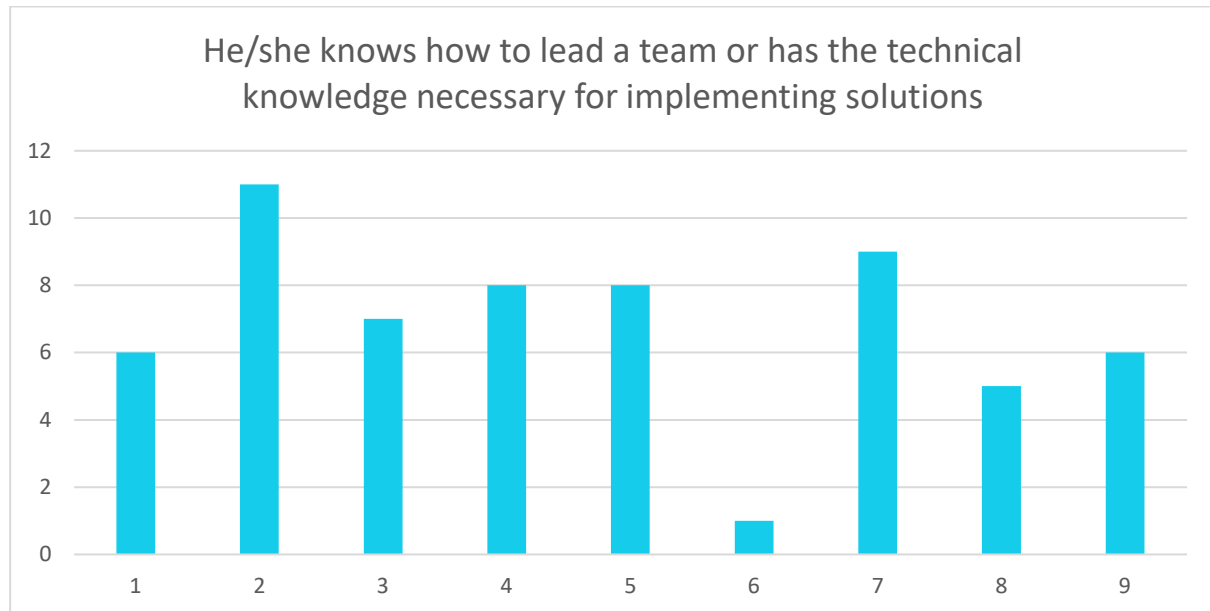


Figure 4 Relevance of different competencies for PMs in the IT sector expressed as mean value



We asked participants to evaluate which competencies would be more important for PM in their companies, those linked to project management skills or IT skills. The results indicate that both sets of competencies are equally important, with PM skills being slightly more important.

Figure 5 PM vs IT skills 1



The instructions for the participants were as follows: Each statement reflects two different competencies, e.g. to lead a team or technical knowledge. If leading a team is a more important competence in your company for project manager, you will choose numbers between 1 and 3, 1 giving the most value to team leadership competencies. If both competencies are of the same importance, you will choose a number between 4 and 6, 4 giving a bit more importance to leading a team and 6 giving more importance to technical knowledge. And if your company values more technical knowledge of Project Managers, you will choose numbers between 7 and 9, 9 giving the most value to technical knowledge.

Figure 6 PM vs IT skills 2

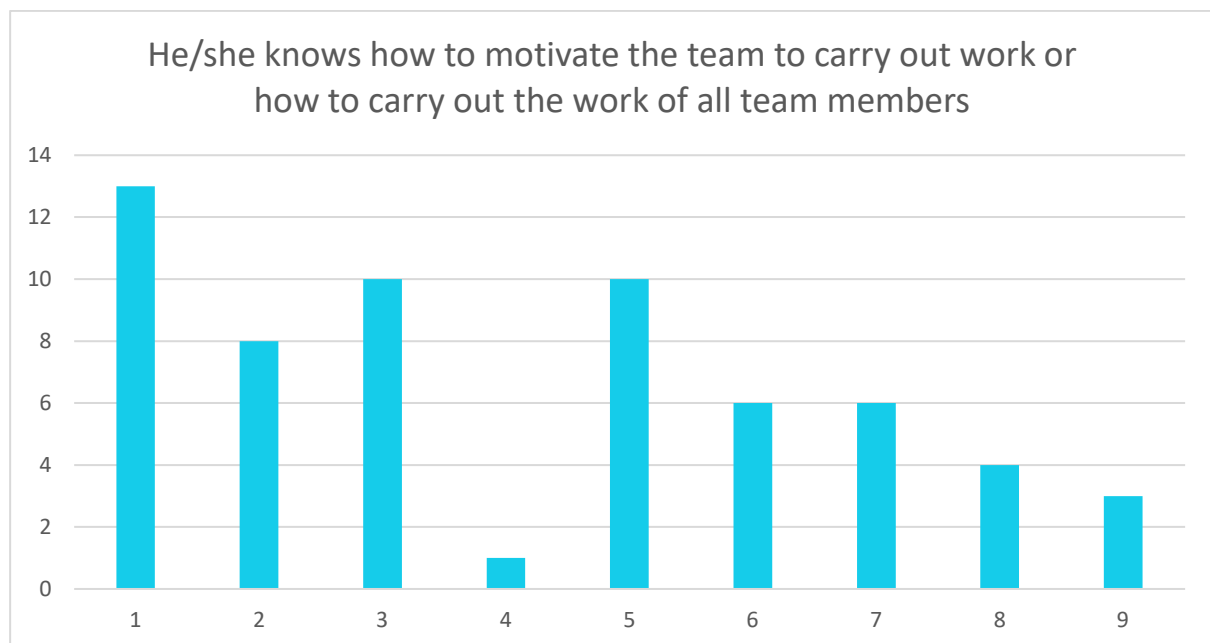


Figure 7 PM vs IT skills 3

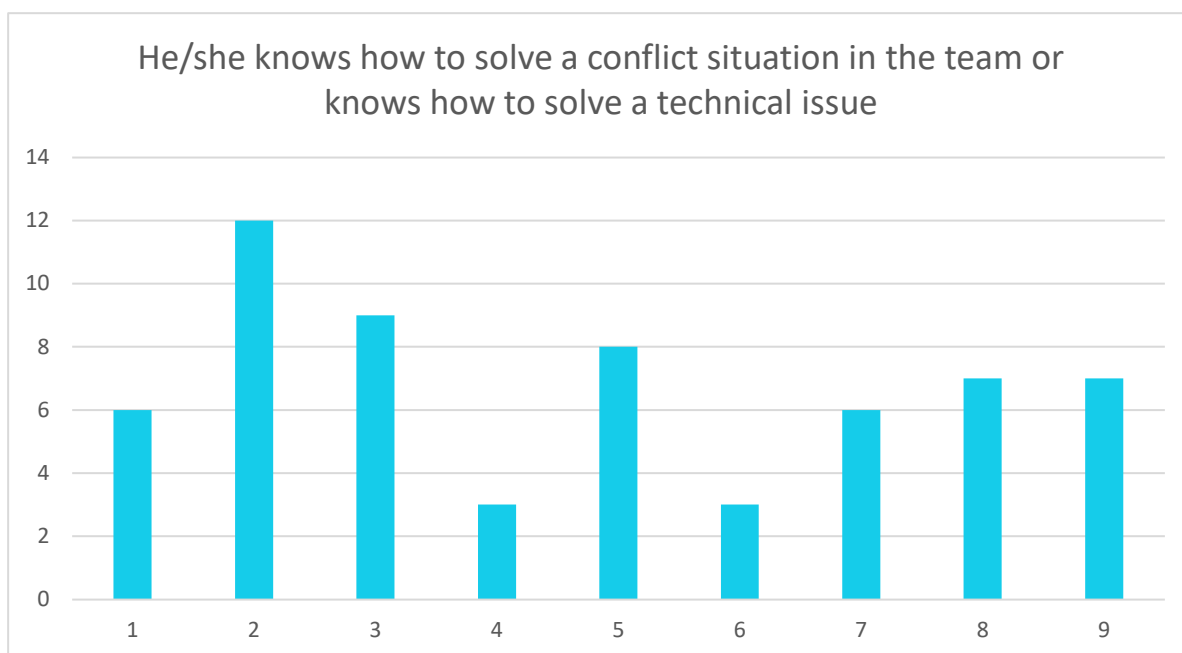


Figure 8 PM vs IT skills 4

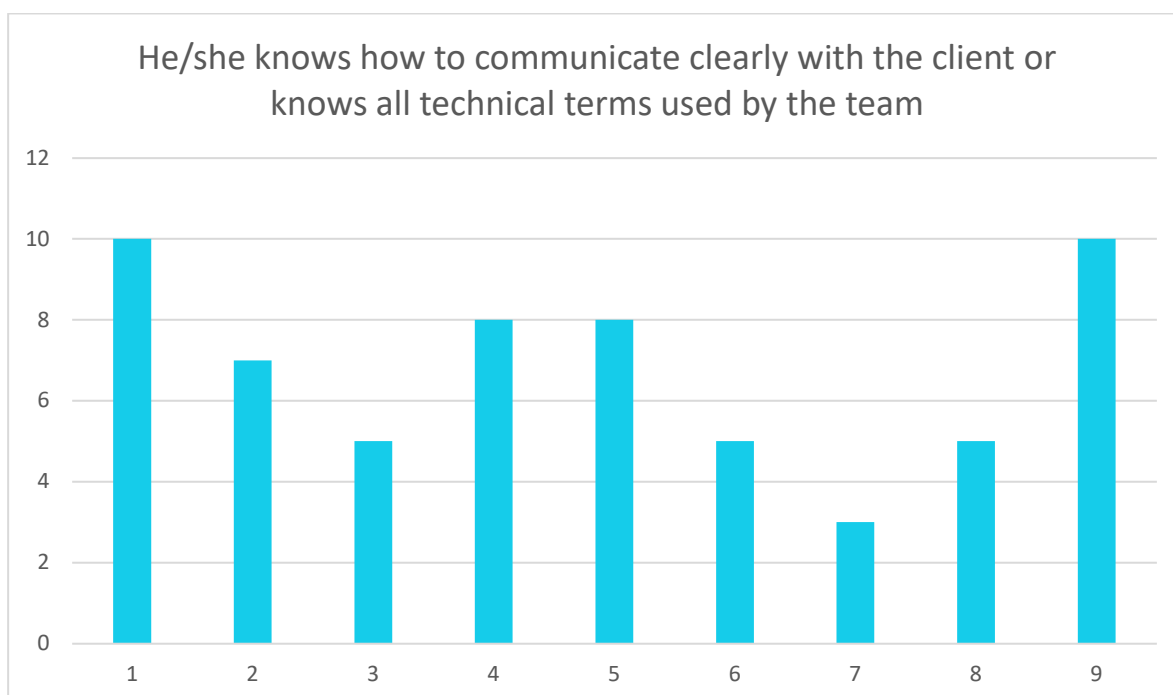
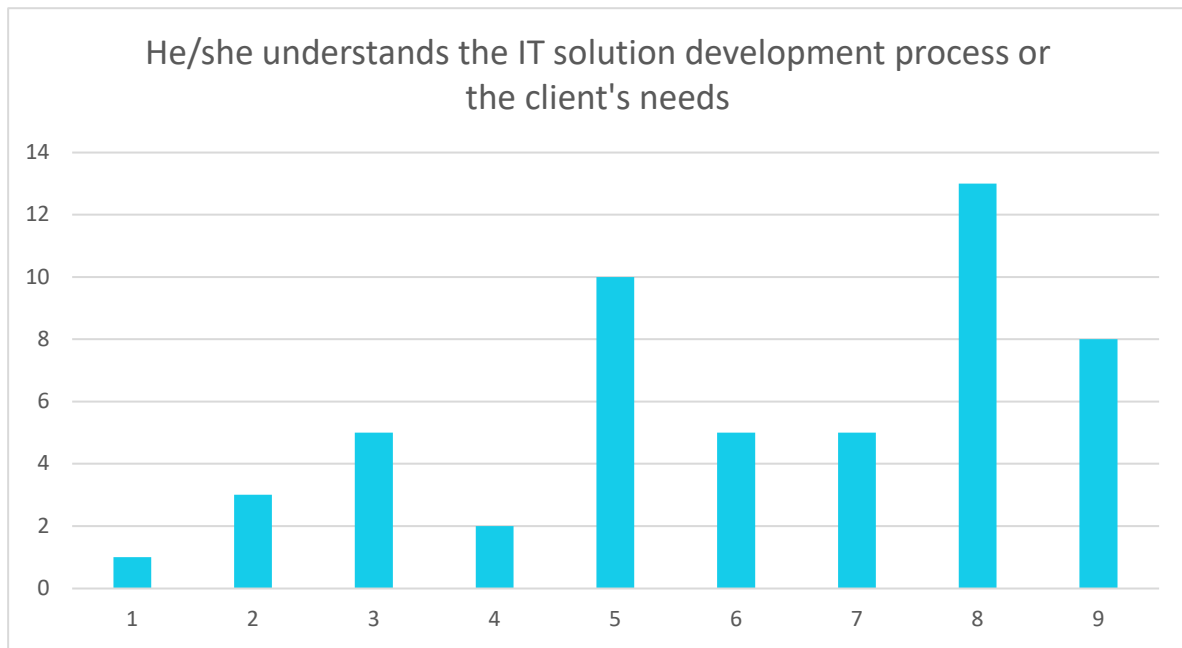
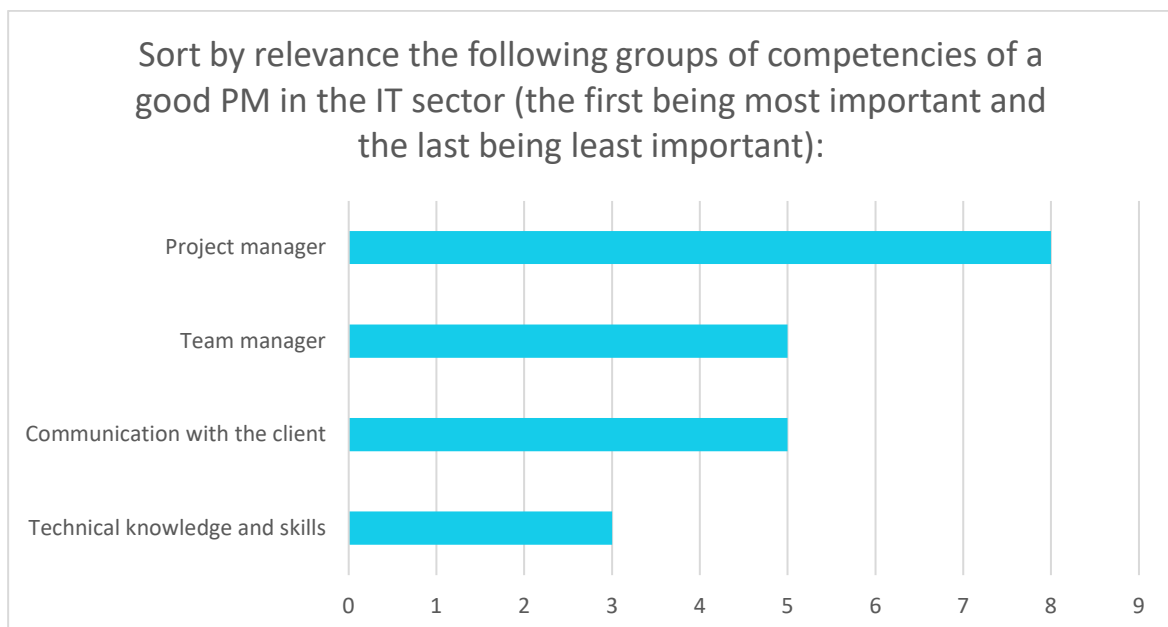


Figure 9 PM vs IT skills 5



In addition, we asked participants to sort by relevance the groups of competencies of a good PM in the IT sector (the first being most important and the last being least important) we obtained the following order:

Figure 10 PM vs IT skills 6



According to the research, only a small proportion (10%) of companies wouldn't hire a PM without a diploma connected to IT, while 52% would hire and 38% of respondents are not sure.

Figure 11 Relevance of IT diploma for PMs in the IT sector

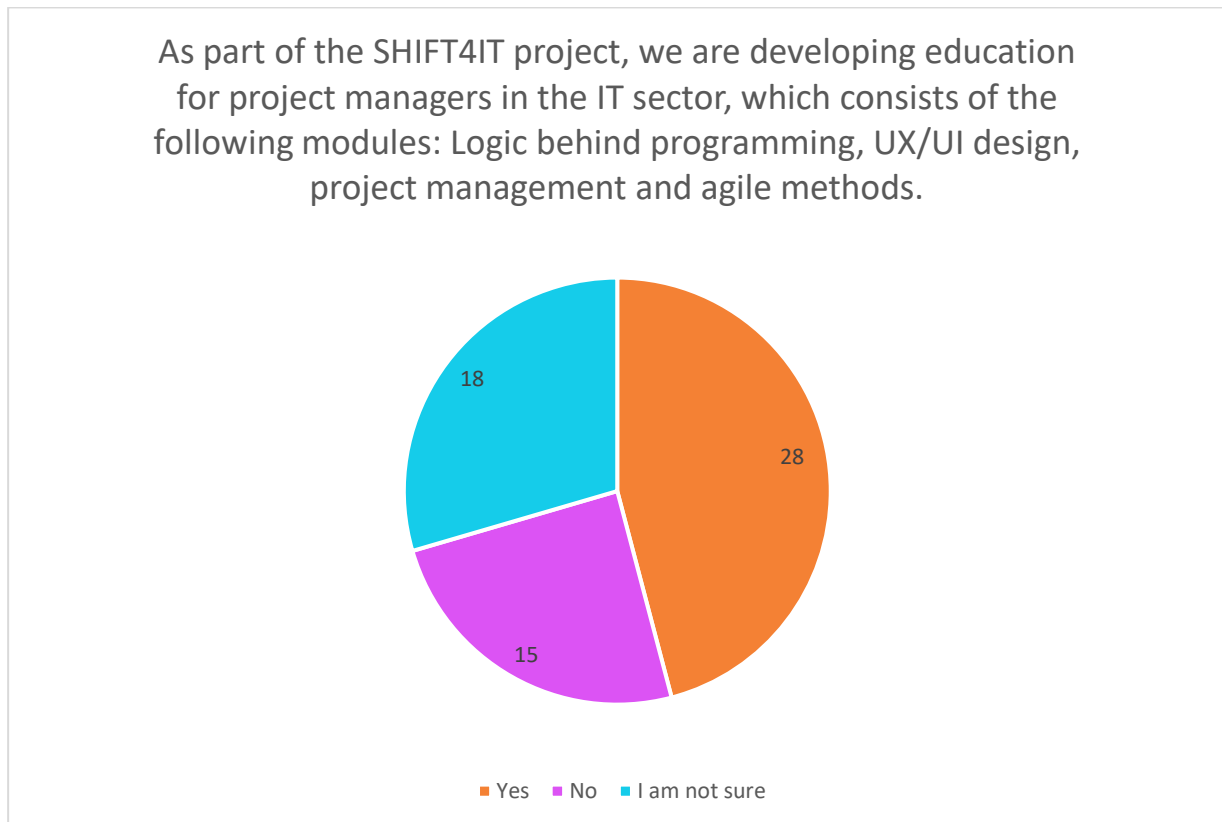


When asked why they would or wouldn't employ young people with diplomas in humanities and social sciences two types of companies became distinct. Out of those who wouldn't (8%) consider specific IT knowledge very important within their companies and they consider that only IT experts with (many) years of experience within the company can become PM and some of them (2%) are too small to have a PM who isn't working on the development of the product while managing the whole team.

The rest of them (90%) would employ or would consider employing young people from the SHIFT4IT project based on the selection procedure and evaluation of their skills and knowledge. Those who would employ SHIFT4IT participants stress the importance of communication, motivation, successful team management, ability to build relationships with team members and customers, organisational skills, productivity, willingness to learn, empathy, problem-solving skills, social skills as those that are hard to develop within their company while some of them consider it mostly as skills "people are born with" and can't be simply learned. Nevertheless, basic technical knowledge is essential, while they stress that regardless of the diploma obtained, specific technical skills they require are too specific to be obtained in a formal education system.

When asked if they think something is missing in defined education, most of them stated yes and answers are mostly oriented toward communication, different management skills and specific IT knowledge.

Figure 12 Evaluation of the proposed curriculum



According to the answers, respondents defined several educational topics to be important, but **missing in SHIFT4IT education to educate successful PMs in the IT sector. Below we present all the answers received, grouped based on the modules in which they are integrated or will be integrated.**

The logic behind product development in the IT sector

- Basic IT knowledge (part of the module)
- Basic network, privacy and security knowledge (part of the module)
- IT security basics (will be integrated)
- Legal and compliance considerations in IT (GDPR and other applications) (will be integrated)
- Cloud computing fundamentals (will be integrated)

The Project Management module

- Team management and HR (part of the module)
- Budgeting a project - budgeting and forecasting, checking the project is in the budget (part of the module)
- Efficient communication with stakeholders, team, management, colleagues, and clients (will be integrated)
- Risk management with an emphasis on solutions to minimize them
- Stakeholder management

- Change management
- Vendor management

The Agile Methods module

- ADKAR methods to promote and encourage digital transformation. Artificial intelligence is evolving very fast IT managers/ consultants should stay on top of that and know how to use this technology in business-related environments.
- Data analysis - A good AGILE system presupposes that the road to development is traced based on data analysis to apply the rules of continuous improvement based on feedback.
- Quality assurance and testing (will be integrated)
- Methods of team organization using IT&C tools (part of the module)
- Time management, prioritization, allocation of tasks (part of the module)

For the UX-UI module, we haven't received comments.

Topics that will be covered by partners as additional topics during the education based on the collected answers:

- Presentation skills
- Soft skills - negotiation, conflict resolution, time management, motivation of co-workers
- Communication methods, when and how we use them effectively
- Financial management for IT projects
- Understanding of basic principles of economics and business
- Soft skills development, including leadership and conflict resolution

Topics that will not be part of the education

- IT infrastructures
- General introduction to marketing and communications and storytelling in the digital space - knowledge of digital/social campaigns, platform models, CRM and so on
- Documenting a business case (technical writing and documentation)
- Knowledge about how a company works, what its goals and strategy are, and how to understand it.
- Aspects related to public procurement

On the level of partnership and based on the results of the Focus groups implemented, partners concluded that the topic of IT infrastructure is too complex and organisation-specific to be part of the module. Organisations that are developing or installing IT infrastructure do it based on the specific needs of vendors and the topic is too broad and specific to be part of the planned education.

Regarding marketing and storytelling, knowledge is needed for specific companies that are more oriented toward PR that aren't the scope of the project, and which usually have one to two IT specialists employed.

According to the results of Focus groups documenting a business case (technical writing and documentation) is defined by each organisation internally and adjusted to the project itself, therefore, partnership can't provide education for it, but we will invite experts and will inform young people how basic business case looks like.

Knowledge about the company and its organisational climate and culture can be learned only by working and therefore participants will feel it during job shadowing activities, not during the education itself.

Public procurement is defined by national law, it's not part of the job of the project manager and therefore will not be included in the education.

Focus groups

To further investigate the results of an online questionnaire and additionally clarify the selection procedure and knowledge expected from project managers in the IT sector, partners developed a semi-structured questionnaire that was implemented in the form of a focus group with selected employers from the IT sector. Instructions for focus groups are available in Annex 2.

Overall, four focus groups were implemented online or face-to-face. 8 companies were involved:

1. Anais Digital (Belgium, multinational)
2. ASDAEX ANGL (Belgium, national)
3. Exevio (Croatia, national)
4. Hackit (Romania, national)
5. iOlap (Croatia, national)
6. IT School (Romania, national)
7. K-Digitale (Italy, national)
8. TBWA (Italy, multinational)

According to the experience of involved companies, IT experts learn managerial skills through work placement, formal education, non-formal education, and experience, but some people have better predispositions for good managerial skills.

They stress that developing managerial skills for IT experts involves multiple factors. It requires a combination of practical experience, continuous education, and leveraging personal traits. No single factor is dominant; instead, the integration of these elements is what shapes an effective IT manager.

Participants agreed that managerial skills can be developed through both formal and informal education, as well as professional experience. Having a good mentor on the job can have an enormous effect on personal development.

Other factors come into play such as cross-sectorial jobs, company culture, work environment, etc. Some skills are easier to attain, some are more difficult. However, personal traits also play a significant role, particularly in how quickly and effectively one can adapt to managerial roles. Even with the best support, resources, and role models, some skills will remain very complex to obtain if they are in contrast or not aligned with personal traits.

When describing the best, or one of the best, project managers (PMs) participants have worked with they stress several different skills, competencies, traits, and experiences that differentiate these project managers from others – most important being a holistic approach to the task and the team from different perspectives.

The best project managers have exceptional technical knowledge with strong organizational and communication skills, as well as motivational leadership. Their people skills were particularly remarkable - they were empathetic, decisive, adaptable, and always maintained high integrity. They excelled at active listening, resolving conflicts, and fostering a collaborative and supportive team environment. Their organizational and structuring abilities ensured tasks were effectively prioritized, deadlines consistently met, and resources optimally allocated. They are respected and acknowledged in the team. What truly made them stand out was their holistic approach, which blended technical knowledge with superior interpersonal skills. This enabled them to empower their team and proactively manage risks, ensuring successful project outcomes.

They know how to support both the internal communication with the team and the external communication with the clients. They have an overview of the project and know how many allocations to make, how many weeks and how many people to allocate to the project.

On a personal level, they are curious, able to learn fast, up to date with new technologies, have a strong need to be up to the task and quickly analyse situations from multiple perspectives.

We asked companies how they implement a selection of PM and what skills, knowledge, experience and traits they evaluate. The selection involves assessing a candidate's skills, knowledge, experience, and capacity for self-training. The process typically includes behavioural assessments, one-on-one meetings, and feedback from team members, with a selection committee making the final decision based on a balanced evaluation.

The selection procedure starts by building job descriptions and identifying potential candidates through performance reviews, manager recommendations, and career development initiatives. After, the selection of potential candidates, tests and interviews are implemented.

Selection criteria include key skills such as leadership, communication, organizational skills, and problem-solving abilities, experience in project management and cross-functional collaboration, and traits like empathy, decisiveness, adaptability, and integrity. In addition, some of the companies check if a person fits into the organisational culture.

In general, the assessment process includes one-on-one meetings, behavioural assessments, assessment of knowledge about the technology, knowledge about PM tools and methods, checking references and/or feedback from team members if the project manager is sought internally. A selection committee consisting of senior leaders and HR, review all assessments to make the final decision, ensuring a

balanced evaluation of technical skills, leadership potential, and interpersonal abilities.

In some companies, once selected, PMs undergo training in project management methodologies and leadership development and are paired with experienced mentors for guidance. A clear transition plan is developed, along with ongoing support through regular check-ins, additional training opportunities, and continuous feedback to ensure their success.

We wanted to find out why sometimes companies choose not to hire certain candidates for a PM position and what influences their decision to hire others. The companies agreed that, excluding the minimal requirements regarding the knowledge, inability to handle stress and poor cultural fit to the organisation are to most distinctive reasons for not hiring a person for the position of project manager.

In the selection process for project manager positions, companies have encountered instances where they opted not to promote certain candidates due to concerns regarding their ability to handle stressful situations effectively. These decisions were influenced by observations of day-to-day work and assessments of their responses to bad news or past experiences involving pressure. Candidates who showed tendencies to panic or become overwhelmed in stressful situations were deemed unsuitable for PM roles, as these positions require individuals who can remain calm, focused, and decisive under pressure.

In other instances, the decision to promote other candidates was influenced by their demonstrated ability to effectively manage stress and navigate challenging situations. While initial impressions of candidates are important, company representatives recognize that these can evolve based on further interactions and assessments. There have been cases where a candidate initially seemed inadequate due to nervousness or uncertainty during difficult tasks but later demonstrated remarkable growth and resilience.

For example, there were situations when colleagues, who initially appeared apprehensive and struggled to handle and take ownership of difficult situations, showcased a willingness to learn, adapt, and remain composed under pressure during subsequent discussions and practical exercises. Through targeted coaching and support, they developed strategies to manage stress effectively and demonstrated significant improvement in their confidence and decision-making abilities.

Sometimes, initial impressions can change over time. For example, a candidate might initially seem inadequate due to a lack of experience or specific skills. However, during the interview process, they might demonstrate a strong willingness to learn,

adaptability, and problem-solving skills, which can significantly improve their suitability for the role. Similarly, a candidate might exceed expectations by showing exceptional leadership or communication skills during the interview, which were not evident from their resume.

While initial impressions play a role in this process, companies choose to assess candidates based on their ability to grow, learn, and adapt over time.

Cultural fit is another crucial consideration; companies prioritise candidates who align well with their company values and team dynamics.

We were interested to find out if the job of a project manager varies depending on the type of projects they lead to better prepare involved women for further job shadowing and job search opportunities. The opinion of focus group participants is that while the core skills and structures of project management remain consistent, the specifics can vary significantly depending on the project type, such as infrastructure versus software development. The approach, processes, and communication details may differ based on the project's demands.

The job of a project manager can vary depending on the type of project they oversee. For instance, in infrastructure projects, PMs manage complex logistics, stakeholder coordination, and risk management. In software development projects, PMs work within Agile frameworks, facilitate communication between developers and stakeholders, and prioritize user experience (UX) and interface design (UI). PMs in UX/UI design projects focus on understanding user needs, collaborating with designers, and managing rapid prototyping and iteration processes. Despite these differences, core PM responsibilities include planning, communication, risk management, quality assurance, and budget management, underscoring the importance of effective leadership and coordination across all project types.

Companies were presented with the core structure of the educational modules and asked to comment if they thought some topics were missing. Companies evaluated planned lessons as valuable and applicable in a PM's job but have also stated that there are always certain specifics linked to companies respectively and some that differ from project to project. Nevertheless, they facilitate their PMs internally to develop these skills, but they don't include them as criteria in the onboarding process.

Some of the comments defined for each specific module:

- A financial/economic module might be added. In smaller companies PMs sometimes have to tackle also financial aspects of the projects

- In the UX/IX lesson “principle of design” might be changed to “principle of design thinking” which could be more useful for understanding the process. The introduction of UX could talk about 2 things: what is the user experience and what is the process of UX thinking. UX writing can be replaced with service design: when UX/UI touches some non-digital elements, it is important to understand the process of the customer (customer selling, customer support...).
- In the programming part, it is not mandatory they know everything, it is important to know how, what it means and how they interact for different topics. It would be wise to add cloud, to understand how we don't work with servers. E-commerce and mobile X: might be added in the introduction.
- In the Project Management part, a new methodology for big companies “SAFe”, The Scaled Agile Framework, can be added and Kanban is useful for a list of tasks.
- In general, it is recommended to include an internship, not just short job shadowing. A couple of weeks of internship would allow young women to work on different projects.

Results of the online questionnaire showed that financial skills, B2B skills, and knowledge about the process of quality testing and project documentation are needed for project managers, we needed to further discuss this topic during the focus groups. Based on the results, B2B skills are important and basic budgeting at the level of the team. In general, companies have their accounting departments that oversee project budgets, and their standard documentation for smaller projects and they develop it over time, while quality testing is the job of the Quality assessment team.

Financial skills are important, but not all project managers handle budgets directly. The ability to understand and align budgets with project goals is vital, and financial acumen can significantly enhance a manager's effectiveness, especially in negotiations and resource allocation. For the PM it's more important to keep the budget in line with the agreement, in other words, to manage and evaluate the time of the team and keep it in the budget.

B2B (business-to-business) skills are essential for project managers. These skills enable them to effectively communicate with clients, understand their needs, and negotiate agreements that align with both their objectives and the company's capabilities. Project managers act as the primary point of contact for clients throughout the project lifecycle, from initial agreements to later phases. By combining project management expertise with sales skills, PMs contribute to business growth, customer satisfaction, and overall project success. Therefore, B2B skills are highly valued and integral to the role of a PM in companies where they also serve as sales representatives.

In involved companies, *technical writing and documentation of projects* encompass the creation of clear, concise, and accurate documents that outline project requirements, processes, procedures, and outcomes. The approach to documentation varies depending on the complexity and uniqueness of each project. For simple and repetitive projects, they have established standard procedures and templates that project managers and teams follow, including project plans, required documents, progress reports, and user manuals. These standardized procedures streamline documentation efforts, improve efficiency, and ensure consistency across similar projects. However, for projects that are complex or unique, PMs collaborate with the team to develop new procedures and documentation templates tailored to the project's specific requirements. Regardless of whether standardized or customized procedures are employed, their teams continuously adapt and refine documentation based on project feedback, lessons learned, and changes in project scope or requirements. This flexible approach ensures that the project documentation contributes to successful project outcomes, and evolves to incorporate new technologies, methodologies, and industry standards. In addition, it ensures that the documentation is relevant and useful for its intended audience, whether they are developers, data analysts, clients, or end-users.

Quality assurance and testing are tailored to each project's specific needs, with the project team collaboratively defining the procedures and selecting the appropriate tools. This approach ensures that QA processes align with the project's unique requirements and goals. The team identifies quality metrics, testing methodologies, and success criteria, and then implements and monitors the testing process. Continuous improvement is achieved through regular reviews and refinements based on feedback and testing outcomes, ensuring high-quality standards and successful project delivery.

While the PM oversees the overall quality of the project, the specific QA procedures are typically defined by our QA team. The PM ensures these procedures are followed and any issues are addressed promptly, coordinating with the QA team to incorporate feedback and continuously improve our processes.

Conclusion

As it was clear from the research results, different companies have different yet similar internal structures – the project manager oversees the project team and collaborates with the management board, accounting office and quality assurance team. Only in smaller companies, the tasks of project managers differ from leading the IT team to being a sales representative, accounting officer and so on. Based on the education plan, our participants will be prepared to run projects in medium-sized companies with accounting and quality assessment teams involved in the projects.

We managed to define skills and traits that are relevant for project managers. It was important to select participants with a strong base for developing successful careers as project managers in IT companies developing software. In addition, during the focus groups, it became clear what approach is used by IT companies when employing PMs and therefore, we are now able to adjust our selection procedure to prepare participants better for future job searches.

Based on the proposed curriculum, 90% of involved companies are interested in employing SHIFT4IT participants. They stress the importance of communication, motivation, successful team management, the ability to build relationships with team members and customers, organisational skills, productivity, willingness to learn, empathy, problem-solving skills, and social skills as those that are hard to develop within their company while some of them consider it mostly as skills “people are born with” and can’t be simply learned. Nevertheless, basic technical knowledge is essential, while they stress that regardless of the diploma obtained, specific technical skills they require are too specific to be obtained in the formal education system and can only be developed within their company.

Based on the evaluation of the proposed curriculum we got very positive feedback from companies with suggestions of including several topics they find very important in today's IT sector. Therefore, we will adjust the proposed curriculum following the data gathered in the online questionnaire and focus groups.

Annex 1 Online questionnaire

Questionnaire for IT sector representatives

Dear IT company representative,

Thank you for your interest and the effort you will put into helping us to create the educational path for future IT project managers in the Erasmus+ project SHIFT4IT (Shifting the paradigm for women in IT sector).

This questionnaire is a first step in defining the educational path and it should help us to select the ideal participants of education we will create, but also to develop highly relevant curriculum and educational materials for future IT project managers.

When we think and talk about IT project managers, we think of the people in your company who are responsible for leading the project(s), team(s) and specific areas of operation important for your company business. The name of the position is usually: project/program manager or technical project/program manager.

During three years of the SHIF4IT project, we will develop training for project managers in the IT sector that should help them to understand the developers' language, be able to coordinate teams and act as the bridge between the developers and administration, clients, or end users.

The education consists of 2 parts, IT education and Project management education. IT education consist of logic behind product development in the IT sector (40 hours) and UX/UI design (70 hours). Project management education consists of Agile methods (30 hours) and Project management (20 hours).

The logic behind product development in the IT sector will give participants basic skills in programming languages (variables, loops, logic, arrays, functions, algorithms, object-oriented programming), web (HTML, CSS, JavaScript) and app development (frontend and backend technologies) with databases.

The UX/UI module will focus on analyzing and understanding the needs of end-users to create digital products and services that are intuitive, efficient, and enjoyable for users to interact with, ultimately improving their overall experience.

The project management module is meticulously designed to align with the rigorous standards set by international certifications (e.g. Project Management Institute PMI), ensuring comprehensive coverage of industry best practices, methodologies, and tools necessary for success in today's dynamic project environments.

The agile methods module will focus on analysing and understanding different project management approaches that prioritize cross-functional collaboration and continuous improvement, dividing projects into smaller phases and guiding teams through the cycles of planning, execution and evaluation.

The project will be implemented in Belgium, Croatia, Italy, and Romania.
Estimated time to fill in the questionnaire: 15 minutes.

* Obavezno

Basic information about the Company

1. Country *

- Belgium
- Croatia
- Italy
- Romania
- Other

2. Company you represent: *

3. The number of IT experts you employ: *

4. Your position in the company: *

- CEO
- Member of a management board
- HR
- Project manager in the IT sector
- Ostalo

5. What is the minimal IT knowledge requested from a future project manager in your company? *

- Must be an expert with many years of experience in the technological field covered by the project.
- Must have a degree in the IT field.
- Must be familiar with the terminology and main concepts of the technology we use.
- Must have basic technical knowledge, and advanced knowledge in the field of project management.
- Technical knowledge is not in focus, but rather management of team members with the necessary knowledge.

6. If you want to explain your answer, please do it here:

7. Describe several main tasks that project managers are responsible for in your company. *

8. What knowledge and skills do project managers in your company have? *

9. What added value project do managers bring to your company; what traits do they have that other team members lack? *



10. On a scale from 1 to 7, one being lowest and 7 being highest, estimate how important the listed competencies are for a project manager in your company: *

	1	2	3	4	5	6	7
Flexibility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clear communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Orientation towards goals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Troubleshooting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conflict resolution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to build team spirit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Work ethics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Positive attitude	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing support to team members	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Responsibility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Loyalty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge of technology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Giving constructive feedback	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Transparency	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Analytical ability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proactivity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stress resistance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Time management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diploma related to the sector to which your organization belongs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to encourage creativity in solving technical challenges among team members	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please select what is more important for PM in your company between two presented options.

Each statement reflects two different competencies, e.g. to lead a team or technical knowledge. If leading a team is a more important competence in your company for project manager, you will choose numbers between 1 and 3, 1 giving the most value to team leadership competencies. If both competencies are of the same importance you will choose a number between 4 and 6, 4 giving a bit more importance to leading a team and 6 giving more importance to technical knowledge. And if your company values more technical knowledge of Project Managers, you will choose numbers between 7 and 9, 9 giving the most value to technical knowledge.

11. He/she knows how to lead a team or has the technical knowledge necessary for implementing solutions *

1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---

12. He/she knows how to motivate the team to carry out work or how to carry out the work of all team members *

1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---

13. He/she knows how to solve a conflict situation in the team or knows how to solve a technical issue *

1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---

14. He/she knows how to communicate clearly with the client or knows all technical terms used by the team *

1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---

15. He/she understands the IT solution development process or the client's needs *

1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---

16. Sort by relevance the following groups of competencies of a good PM in the IT sector (the first being most important and the last being least important): *

Project management
Team management
Technical knowledge and skills
Communication with the client

17. Please, explain your answer: *

18. Would you hire a project manager who graduated from humanities and social sciences? *

- Yes
- No
- I don't know

19. Please explain your answer: *

20. As part of the SHIFT4IT project, we are developing education for project managers in the IT sector, which consists of the following modules: Logic behind programming, UX/UI design, project management and agile methods. Do you think we left out some crucial knowledge from education? *

- Yes
- No
- I am not sure

21. If your answer is yes, please indicate what you think we have omitted:

22. Would you hire someone who completed our training, lasting 160 hours, which consists of 4 modules, and who during the training cooperated with IT companies and worked on examples from practice? *

- Yes
- No
- It depends

23. Would you be interested in becoming more actively involved in the project as a company, for example to offer a case study that will be part of the education, mentors or to enable job shadowing for people who will be educated in our project? *

- Yes
- No
- I need more information about the project

24. If your answer is YES, please indicate what you would like to be involved in:

- We can offer case studies.
- We would be happy to include our experts as mentors in the project.
- We would organize job shadowing in our company for your trainees.
- We would be happy to participate in the events that you will organize in the project.
- We would be happy to receive regular information about your project.

25. If your answer on questionn 23. is NO, please explain:

26. Please leave your contact information so that we can continue communication and cooperation:

Thank you for your input! We really appreciate your answers, and we will use it to make our training curriculum useful and relevant.


If you show interest in becoming more active in this project, we are looking forward to further cooperation.

NOTICE on personal data protection

Centre of Technical Culture Rijeka
Personal data protection officer
Contact: aratkajec@ctk-rijeka.hr
Školjić 6, Rijeka
OIB37724328387

The Centre of Technical Culture Rijeka processes your personal data to organize and implement the activities for further co-operation on the SHIFT4IT project. You can read more about the processing of your personal data in the General notice on the processing of personal data available at: <https://webgate.ec.europa.eu/erasmus-esc/index/privacy-statement>

Microsoft nije stvorio niti podržava ovaj sadržaj. Podaci koje pošaljete bit će poslani vlasniku obrasca.

 Microsoft Forms



Annex 2 Focus group template

Instructions for the implementation:

Below you have an introduction to the project and results gathered with the questionnaire. After you present the main idea and results, ask participants of focus groups defined questions and based on their answers be free to add additional questions to gather any information you consider relevant for the project.

For the beginning introduce yourselves, the project and the results and after it start with the questions. The questions don't have to be placed in the specific order they are in this document, but please cover all of them during the conversation.

If we manage to collect data about lessons planned in each module, put those on a slide and please keep printed the last 2 pages of the research so you can ask additional questions regarding their opinion on what is missing in general.

Introduction to the project:

During three years of the SHIF4IT project, we will develop training for project managers in the IT sector that should help them to understand the developers' language, be able to coordinate teams and act as the bridge between the developers and administration, clients, or end users.

The education consists of 2 parts, IT education and Project management education. IT education consist of logic behind product development in the IT sector (40 hours) and UX/UI design (70 hours). Project management education consists of Agile methods (30 hours) and Project management (20 hours).

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The UX-UI module will focus on analyzing and understanding the needs of end-users to create digital products and services that are intuitive, efficient, and enjoyable for users to interact with, ultimately improving their overall experience.

The project management module is meticulously designed to align with the rigorous standards set by international certifications (e.g. Project Management Institute PMI), ensuring comprehensive coverage of industry best practices, methodologies, and tools necessary for success in today's dynamic project environments.

The agile methods module will focus on analysing and understanding different project management approaches that prioritize cross-functional collaboration and continuous improvement, dividing projects into smaller phases and guiding teams through the cycles of planning, execution and evaluation.

Introduction to the results:

According to the results of the questionnaire you participated in, we came up with the conclusion that prior technology knowledge is important to all companies, but many of them stress PM skills above IT skills and consider that specific technology they are working with is something that most of their IT experts learn by doing, meaning that regardless of their studies it would be too much to expect that they understand it to a professional level after formal education.

Today, we'd like to discuss with you what makes a person a good PM according to your experience in the IT sector, how you decide who to employ as a PM and we will discuss in more detail what topics should be covered in our education.

Questions for the participants:

1. According to your experience, managerial skills of IT experts can be learned during the work placement, formal education, non-formal education, experience, or you think they are predefined by the traits a person possesses or some kind of mix.
2. Can you describe the best, or close to it, PM you have worked with? His/her skills, competencies, traits, and experience. What made that person the best PM?
3. How do you implement a selection of PM in your company?
4. What skills, knowledge, experience and/or traits do you evaluate?
5. Why didn't you employ somebody and what made you employ somebody else as PM? Think of a people for which you felt that they were great and then they weren't and the opposite, those you think will not be good enough and proved to be the best option.
6. How much does the job of a project manager differentiate in different types of tasks? E.g. is the job of a PM for infrastructure projects much different than project manager in software development projects or UX/UI design projects?
7. Here is the list of lessons planned in SHIFT4IT education in more detail. Please look at them and tell us what topics should be incorporated into our lesson plan.

Programming	UX/UI design	Project management	Agile methods
Programming Basics	-Introduction to UX	Project Management Fundamentals: -Describe common project management approaches; - Describe the role of ethics in project management; - Identify basic leadership skills; - Describe project communications	Introduction to Agile principles and values
Algorithms	Principles of ergonomics	Starting the project: -Describe a project charter; - Differentiate between various stakeholder roles and responsibilities.	Fundamentals of Agile project management methodology
Databases	Principles of design	Planning the work: -Describe the purpose of the project management plan; -Describe the concept of project scope; -Describe the concept of project scheduling; -Describe the concept of project budget;	Managing a project with Agile approach: methodologies and SCRUM tools
Fundamentals of Web Programming	Information Architecture	Completing the work: -Monitor project scope, schedule, and budget; -Describe the concept of quality in project work; -Describe the change management process.	Planning of activities in relation to the production capacity of the team: the creation of a backlog
Web development Frontend	-Information Architecture	Ending the project: - Verify project completion; -Describe project closing activities related to documentation.	Measuring performance and prevent the failure of the practice

Web development Backend	-Design system & Prototyping		
	User testing		
	UX writing		
	Accessibility		
	Metrics		
	Project		

In case they don't mention skills listed by respondents of the questionnaire, below are a few questions that should be asked.

8. How important are financial skills for PM in your company? Does this person define budget and offers, or it is more included in keeping the budget in line with the offer?
9. How important are B2B skills? Does the PM in your company act also as a sales representative in initial agreements or is more oriented toward communication with clients in later phases?
10. What do technical writing and documentation of projects involve? Is it something specific for each company, e.g. your company have defined procedures to follow and templates or these change for each project?
11. How is Quality assurance and testing performed in your company, does PM define the procedure of it or you have defined procedures and tools?

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Shifting the paradigm for women in IT sector

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